FAA AVIATION NEWS

MAY 1971

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AVIATION SCHOOL

COVER
That eerie, electronic voice in the wilderness, crying for help, could be your ELT. See page 4.

FAA AVIATION NEWS

DEPARTMENT OF TRANSPORTATION / FEDERAL AVIATION ADMINISTRATION VOL. 10, NO. 1

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John A. Volpe, *Secretary of Transportation*
John H. Shaffer, *Administrator, FAA*
James R. Greenwood, *Director of Public Affairs*
Lewis D. Gelfan, *Chief, Publications Division*

FAA AVIATION NEWS is published by the Office of Public Affairs, PA-20, Federal Aviation Administration, Washington, D. C. 20590, in the interest of aviation safety and to acquaint readers with the policies and programs of the agency. The use of funds for printing FAA AVIATION NEWS was approved by the Director of the Bureau of the Budget, July 14, 1967. Single copies of FAA AVIATION NEWS may be purchased from the Superintendent of Documents for 20 cents each. All printed materials contained herein are advisory or informational in nature and should not be construed as having any regulatory effect. The FAA does not officially endorse any goods, services, materials, or products of manufacturers.

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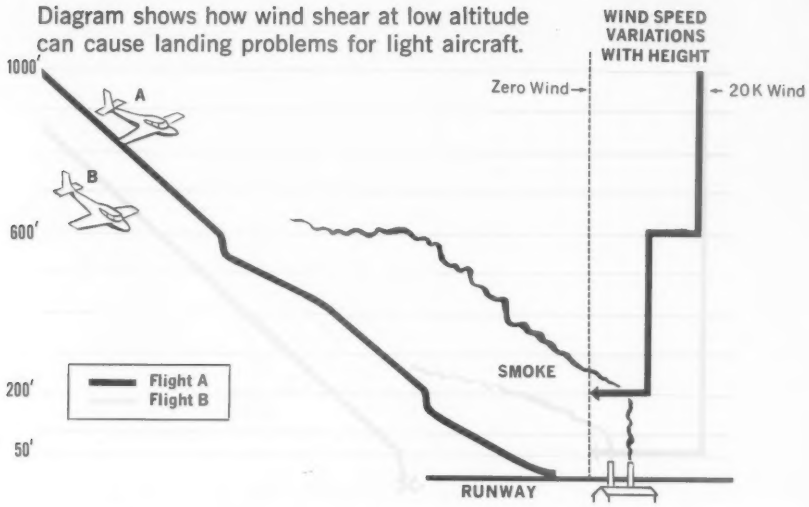
Fig. 1

Diagram shows how wind shear at low altitude can cause landing problems for light aircraft.



WIND SHEAR

Landing uncomfortably short or overshooting an airstrip is an experience common to beginning pilots, but even seasoned pilots have occasionally suffered from this embarrassing predicament. In some cases it may be due to the presence of an unsuspected wind shear for which no adequate control compensation has been made.

Wind shear, usually defined as *an abrupt change of wind direction or speed*, can occur at all altitudes and with all degrees of severity. The area of shear—where the actual change in speed or direction takes place—is commonly marked by turbulence sufficient to attract the pilot's attention. But the pilot busy with approach and landing procedures may fail to respond correctly to the atmospheric signals, and consequently find that he is unable to set his aircraft down for a safe landing.

The most common type of wind shear near the ground consists of a fairly progressive decrease in wind speed. The rate of wind shear may be as high as 12 knots per 100 feet, although this is rare. A shear rate of five to ten knots per 100 feet is more common, with the rate of shear increasing near the ground where zero wind may be encountered. The shear pattern is by no means fixed: wind speed may alternately increase and decrease as the ground nears, or cease entirely at any altitude. Ground obstructions, such as buildings, trees, hills, etc., are a contributing influence, as are local atmospheric conditions.

When a pilot making an approach to land encounters an abrupt drop in headwind, his airspeed will fall off sharply and his aircraft could even stall. If no corrective action is taken, the airplane will drop well below the normal glide path until it picks up flying speed—or strikes the ground.

The illustration (Figure 1) shows what might happen to two aircraft landing through two different wind shear variations, if the pilots had locked the power setting and attempted to hold a normal approach speed by means of the elevator. Descending from 1,000 feet to 600, aircraft A encounters a 50 percent reduction in headwind, causing the aircraft to lose airspeed and dip earthward momentarily until flying speed is regained. At 200 feet the headwind ceases altogether, and aircraft A again partially stalls and loses altitude before recovering airspeed and re-establishing the proper glide angle.

Aircraft B encounters a much more abrupt wind shear, as the headwind falls to zero suddenly about 50 feet above ground. The chances of recovering from a stall at this altitude are not good.

Landing through wind shear at critical altitudes calls for some or all of the following procedures:

1. Watch the wind. Use all available means of wind and weather information to anticipate wind shear and gustiness. Check the winds aloft as well as surface winds at your destination airport. If there is a 20K wind at 5,000 feet and a dead calm on the ground, you can be pretty certain a shear area will be encountered somewhere during the descent to land. Look for smoke, flags, pennants—any wind indicators that will give you more immediate information than the latest weather report.

2. Keep your airspeed up. If you have reason to suspect wind shear or gusts while landing, use power to carry a larger margin of airspeed over stall speed.

3. Use good judgment. If you can see an inversion over the airport and you learn that the winds aloft are pretty strong, you can expect to find the wind playing tricks on both landing and takeoff. If you lack experience with the airplane, this may be a good day for some ground schooling.

If, in spite of all precautions you do find yourself in a wind shear-induced sink when close to the ground, your recovery procedure is the same as recovery at altitude: apply immediate power and drop the nose; raise the nose as soon as flying speed is achieved and reduce power as required. Needless to say, you want a minimum loss of altitude.

Inexperienced pilots sometimes panic when they encounter wind shear near the ground: seeing solid earth 100 feet or less below, they may try to pull the nose up before lowering it—without flying speed it cannot be done.

When landing under variable wind conditions, most alert pilots are able to make continuous throttle and elevator adjustments that retain the desired approach speed and glide angle. The pilot who gets into trouble is usually the one who locks the throttle in a given rpm setting during the landing approach and relies on elevator alone to maintain a constant airspeed. This technique may work in a no-wind or steady-wind condition, but when the winds are variable or gusty, the airplane may be landed short or long with serious consequences.

Nothing is more unpredictable than the behavior of wind. To keep it from playing tricks on you, you want immediate access to power as well as flight controls. Do not glue both hands to the wheel. ■

(This article was based in part on discussions taking place during the DOT/FAA Turbulence Symposium, March 22-24, 1971, in Washington, D.C. For a complete list of papers presented at this meeting contact DOT/FAA FS-60, 800 Independence Ave., S.W., Washington, D.C. 20590.)

Lost and Go Seek

Mandatory locator beacons are just over the horizon.

Great country to fly over—but a downed aircraft hidden in the shadows would be almost impossible to find without a locator beacon.

The distinctive sound of the Emergency Locator Transmitter (ELT), which a new Federal law makes mandatory for virtually all general aviation airplanes, was designed to attract attention—and it does. It s signal, a composite of a whistle, siren and yelp, broadcasts a low-key but attention-arresting "eyoo-eyoo-eyoo-eyoo" two to four times a second, on the emergency frequencies. Earlier models used a single-toned whistle sound, but the sweeping tone was found to be more noticeable and recognizable and is now accepted as standard. (The audio frequency is described as a downsweep over a range of not less than 700 Hz within the range of 1600 and 300 Hz.)

The Emergency Locator Transmitter (formerly called an "emergency beacon," "crash locator beacon" or simply "beacon") is a compact, lightweight, self-contained piece of electronic equipment designed to be carried in an aircraft. By radiating a continuous distress signal simultaneously on the two emergency frequencies, the unit can aid searchers in finding an aircraft after a forced landing or accident. (Civil emergency frequency is 121.5 MHz; military uses 234.0 MHz.)

The power output of most ELT units is relatively small, but the signal is designed to carry at least 50 miles on a line-of-sight basis for at least 48 hours. A search plane with direction-finding equipment, or any pilot with VHF communications transmitter and a familiarity with aural techniques, can home in on the distress signal and expedite the search mission. Numerous models from different manufacturers are on the market; most resemble a small portable radio—some pocket-style, some designed to be permanently fixed to the airframe.

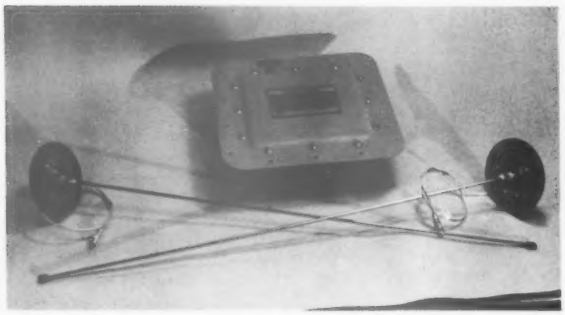
Most units are designed only to transmit the distress signal. While some of the more sophisticated and expensive models can also be used for two-way communication, this is not considered an entirely desirable feature, since voice transmission will interrupt the broadcast of the distress signal and hamper search efforts. An estimated 30,000 ELTs are presently in use. Prices have ranged from about $80 to more than $500.

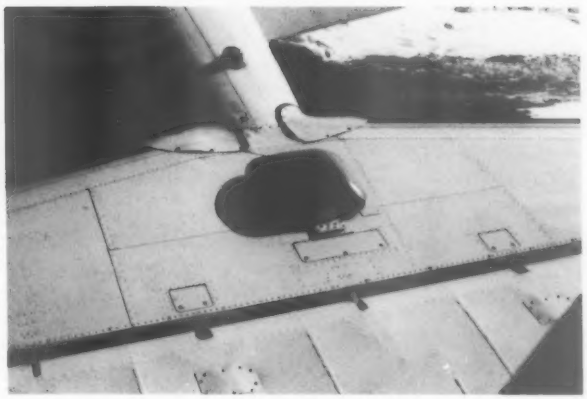
The idea of a transmitter to radiate a distress signal in case of emergency is not new to aviation. It has been used in various forms and discussed for many years. While there has been little opposition to the voluntary concept, an acceptable mandatory design has been slow to develop.

During the past three years FAA has issued two Notices on the subject. In early 1968 comments were solicited concerning the type of device needed, the power required, and the types of operations which should be covered. Using the information gained from responses, a Notice of Proposed Rule Making was issued on March 17, 1969, which proposed that a "crash locator beacon" be required equipment for air taxi and commercial operators under Part 135, and that "survival radio equipment" be carried on such aircraft when flying overwater.

The tremendous response to both Notices indicated a great interest in the subject, but before the rulemaking action was completed by the agency, Congress in late 1970 enacted a law (Public Law 91-596, Section 31) amending the Federal Aviation Act of 1958 to require virtually all general aviation airplanes to be equipped with the emergency locator transmitters. Each airplane delivered in the United States after December 30, 1971, must be equipped with an ELT, and all other airplanes, excluding a few specified exceptions, must be so equipped by December 30, 1973. Excepted are jets, military planes, aerial applicators, and planes used solely for training within 20 miles from their home base.

The Federal law came into being as an amendment to the Operational Safety and Health Act of 1970 (December 29, 1970), an Act not otherwise basically concerned with aviation. The somewhat unexpected enactment of the statute has accelerated the formulation of FAA regulations and standards for the use and manufacture of the units. FAA has now issued a Notice of Proposed Rule Making (Docket 10915, Notice No. 71-7) which would amend Parts 25, 29, 37, 91, 121, 123, and 135 of the FARs, spelling out those operations for





A wide variety of emergency locator transmitters—called by various names—are already on the market, and more are appearing all the time. An estimated 30,000 are in use, but until the Federal standards are finalized, FAA advises prospective purchasers to exercise caution in making a selection.

which an ELT would be required under the law, and specifying the type of transmitter to be used for a particular operation. The proposal further emphasizes that the enactment of Public Law 91-596 and the adoption of FAR 91.52 will provide complete Federal regulations regarding Emergency Locator Transmitters to the exclusion of any State regulation regarding such devices. (Two states—California and Washington—have already enacted ELT laws.)

The proposed rule also sets up the Technical Standard Orders (TSOs) which prescribe the minimum standards for the manufacture of ELT units to meet the requirements of the law. These TSOs will be based on the minimum performance standards developed by the Radio Technical Commission for Aeronautics (RTCA), plus certain additions. (RTCA acts as a coordinating body for government and industry in developing standards which are normally acceptable to both.)

Both Personnel and Automatic ELT types under the proposed TSOs would be capable of being activated both automatically (by means of a gravity load switch) and manually. The units will thus be useful for both violent crashes (which might render the occupants of the aircraft unconscious) and gentle forced landings.

As presently proposed, minimum power output for both Personnel and Automatic ELTs will be 75 milliwatts—sufficient to broadcast on a line-of-sight basis more than 50 miles, even in such unfavorable conditions as an adverse antenna orientation, terrain interference, or bad weather. Unquestionably, if the power minimum were reduced, the weight, size and cost of the unit would also be reduced, and possibly the usefulness of the unit as a safety device. (General aviation nav-com transmitters are rated at about 10 watts as compared to the 75 milliwatts (or .075 of one watt) proposed for the ELT.)

Standards call for the ELT to be capable of radiating the 75 milliwatt signal for at least 48 hours. Batteries would be dated, and when half of their useful life expectancy had expired—or when they had been actually used—replacement would be compulsory. (Useful life is the time a battery may be stored without losing its ability to meet the power requirements.) Every approved ELT would have a manual test circuit, although the rule will allow use of units without the test circuit if they were purchased before the proposed rule was published.

(Please turn to page 13)

P.L. 91-596, Section 31
EMERGENCY LOCATOR BEACONS

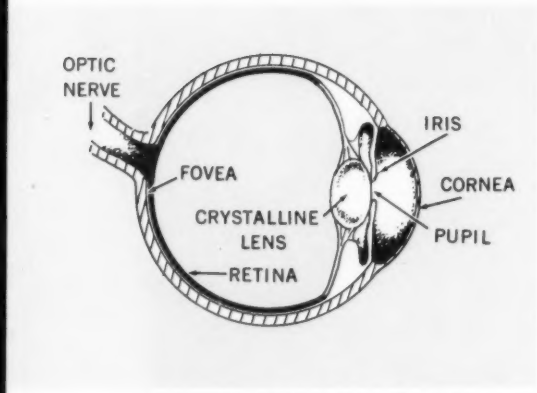
Sec. 31. Section 601 of the Federal Aviation Act of 1958 is amended by inserting at the end thereof a new subsection as follows:

"(d) (1) Except with respect to aircraft described in paragraph (2) of this subsection, minimum standards pursuant to this section shall include a requirement that emergency locator beacons shall be installed—

"(A) on any fixed-wing, powered aircraft for use in air commerce the manufacture of which is completed, or which is imported into the United States, after one year following the date of enactment of this subsection; and

"(B) on any fixed-wing, powered aircraft used in air commerce after three years following such date.

"(2). The provisions of this subsection shall not apply to jet powered aircraft; aircraft used in air transportation (other than air taxis and charter aircraft); military aircraft; aircraft used solely for training purposes not involving flights more than twenty miles from its base; and aircraft used for aerial application of chemicals."



Cross section of the right eye from above.

Cat's Eyes

VFR accidents at night due to over- or under-shooting the runway on final approach are nearly always attributed to faulty distance-rate-of-closure judgment on the part of the pilot. Poor or inaccurate judgments by pilots play a large part in most flying accidents; however, in some cases the pilot has been affected by factors which have insidiously altered his vision. An understanding of how the human eye functions with regard to changing light levels will help prevent some of these accidents.

The eye is a globular shaped organ that transforms light energy into nerve stimuli which are then transferred to the brain. Light rays are deflected when they pass through the cornea into the small elliptical crystalline lens located directly behind the pupil. The crystalline lens focuses the rays onto the retina, the innermost membrane lining the eyeball, which in turn conveys signals to the brain via the optic nerve. Within the retina are the two distinct photosensitive cells of vision, the *rods* and *cones*.

The cones function best in bright light, allowing us to see color and detail. In the dark, or low illumination levels, cones cease functioning and rod vision, less precise than cone vision and with no perception of color, takes over. In transition levels of illumination, such as twilight or dawn, cones and rods are used to varying degrees.

Cones are more densely packed in the fovea, or central region of the eye. They decrease in number toward the extreme edge where they build up again. Rods are found everywhere except at the fovea and are most dense about 18 to 20 degrees from it. For this reason if the eye is looking directly at a small dim object at night (when the cone vision in the fovea is not functioning) the object will not be seen. The gaze should be directed a few degrees to one side of the object to allow light impulses to reach the rods.

Both the cones and rods need time to adapt to the level of light that allows them to function best. This amount of time for cones is only a matter of a few minutes, but rods require at least an hour to adapt totally to the dark—90 percent of this adaptation occurs in the first half hour. During the time of dark adaptation, a substance called *rhodopsin*, or visual purple, is built up in the rods, sensitizing the eye to lower levels of light. Once the eye has become dark adapted, any high intensity light exposure (even a match light) can destroy the visual purple in the rods and nullify the dark adaptation. A bolt of lightning outside the cockpit can do it. *A pilot may preserve his night vision in at least one of his eyes when lighting a match or using a flashlight in the cockpit by keeping one eye closed while the light is on.*

The process of dark adaptation presents a special problem to pilots who are frequently exposed to a wide range of illumination levels during flight—especially when flying in the transition zone of twilight. It is possible to come down from a sunlit altitude of 10,000 feet to find an airport immersed in darkness. The pilot who attempts an immediate landing under these circumstances may not realize that his eyes are still building up to their ultimate sensitivity to low levels of light.

Night myopia (nearsightedness), a common occurrence, comes as a surprise to some people with 20/20 vision in the daytime, who find they are slightly nearsighted after dark. Ordinary eye examination does not usually detect this kind of myopia which is thought to occur from spherical aberration brought about by a widely dilated pupil. In daylight, the small size of the pupil can actually help the eye to focus in the manner of a pinhole box camera.

If you have reason to suspect that your eyes function poorly at night, it is a good idea to find it out beforehand. Final approach on a semi-dark runway is no time for a pilot to discover he is short of sight. With approach systems and runway lights varying in design and intensity from airport to airport, the pilot coming in for a night landing at an unfamiliar airport will need all the vision he can get.

Although night myopia can be compensated for with corrective lenses, the eye's sensitivity to light or lack of it as the level of illumination diminishes cannot be adjusted with glasses. The ability to see in the dark depends on rhodopsin, or visual purple, which builds up in each individual at a rate which varies with the individual and the intensity of the light to which he has been exposed prior to an encounter with darkness. (The pilot can help himself by controlling his exposure to glare before any anticipated night flight by using proper sunglasses discussed later.) For pilots who have been flying in severe glare for several hours, the time the eyes need to adapt to the dark can be extended for long periods.

Flights that begin in the daytime and continue after the sun sets can seriously hamper dark adaptation if the pilot has been flying in bright sunlight or glare for several hours. At night, if cockpit lights are white, they should be kept as low as possible. If a co-pilot is handy during night VFR landings, it is a good idea for the

pilot to keep his eyes on the landing strip and let the co-pilot read out the statistics gleaned from the instrument panel. Periodic confirmatory airspeed and altitude instrument checks are recommended.

The level of light required for adequate vision at night is found to increase with age; pilots over 40 may wish to frequent appropriately lighted landing strips when it comes to touching down after dusk. It is hoped that airport planners will take into account the plight of the pilot just passing his prime who may need quite a bit more illumination at night than his younger counterparts. Loss of sensitivity is also aggravated by the increased "yellowing" of the lens of the eyes with increasing age.

Lack of Vitamin A can decrease visual acuity at night noticeably. Contrary to some popular beliefs, an excess of this vitamin will not improve night vision.

Night vision is also reduced by lack of oxygen. The retina is the first tissue to respond to hypoxia; at 4,000 feet there can be a loss in night vision up to 5 percent which can gradually increase to a 40 percent loss at 16,000 feet. Smoking three cigarettes in a row while in an enclosed cockpit can build up an accumulation of carbon monoxide, with a resulting decrease in avaliable oxygen that could reduce night vision to the same degree as an additional 7,000 feet of altitude. This loss of night vision must be compensated for by increasing the level of illumination.

The color red is produced by a wave length which does not significantly lower the visual purple in the rods. A red light enables the eye to see primarily by cone vision, and at the same time protects the dark adaptation of the rods. The red goggles worn by military pilots for a half hour prior to night flying facilitate dark adaptation while allowing the pilots to function in a semi-lighted room.

Cockpit illumination inside general aviation aircraft is usually white or red. The use of red light generally improves the ability of the pilot to fly by visual reference to the ground. However, red lights inside the cockpit tend to cause eye fatigue after many hours of flight because it calls for the exclusive use of the red color-receptors. (The eye has three types of color receptors: red, blue and green. White light calls into play a combination of all three—eliminating the strain on one set of receptors which might be felt after prolonged use.) Illumination inside the cockpit can generally be regulated in intensity by the pilot.

Light intensity varies with altitude. Light reflected off clouds can be too intense for comfort, and snow that reflects a very high percentage of light can interfere with normal visual adaptation, particularly with regard to ability to distinguish colors.

For those pilots who would like to protect their eyes from glare and sunlight during the day and thus facilitate dark adaptation for night flying, various types of sunglasses which will filter out a portion of the visible light can be worn. The glass commonly used for clear eyeglasses eliminates ultraviolet light and transmits approximately 92 percent of visible and infrared light. Colored filters absorb more light of certain wave lengths and less of others, causing some color distortion. The green filter found in many sunglasses transmits approximately 25 percent of visible light and less than 10 percent of infrared.

Neutral tint filters are similar to green in their transmission of light except that a neutral tint, medium density filter absorbs equal amounts of all wave lengths of light and can therefore reduce light intensity without changing or distorting colors. Neutral tint filters are grey in color but the ones most effective in preventing color distortion are of medium density.

A polarizing filter will transmit light vibrating in a certain direction and absorb the light vibrating in other directions. When used as sunglasses, polarizing filters, combined with a colored filter, transmit approximately 30 percent of the light and are useful in reducing brightness and glare. When the sunlight is glaring off any ground surface, polarized glasses have the unique ability to eliminate the glare more than the surrounding light. However, polarized sunglasses are not recommended for flight when electrically heated windshields are used, since the heat pulse in the windshield may become visible as a flicker sensation, and cause dizziness or vertigo.

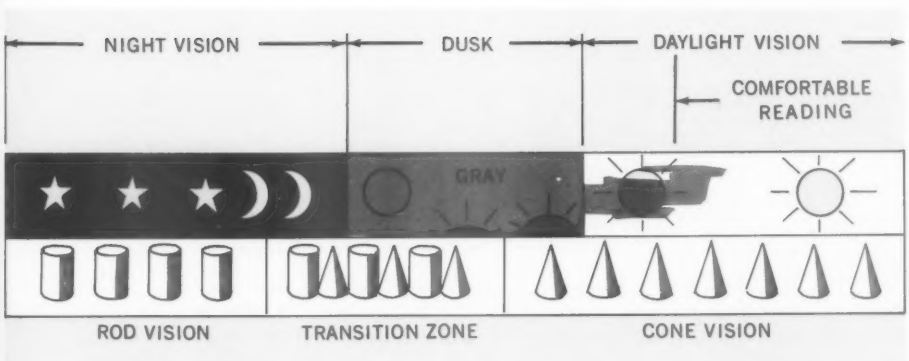
A reflecting coating, usually a mixture of chrome and nickel, on a lens transmits some light and reflects the rest with reflecting filters. These lenses have the appearance of a mirror. "Graded density lenses" that use reflecting filters in the bottom third or top third or both are advantageous during simultaneous exposure to intense glare from above and below.

Sunglasses which transmit 10 to 15 percent of the light are probably best for ordinary flying. Lenses with lower transmission of light are recommended to combat the glare found at high altitudes. Some of the latest styles in eyeglass frames can be hazardous if they interfere with peripheral vision—and peripheral aberrations are more marked with an increase in the size of the lens. Glasses which are shatterproof are advisable.

Pilots considering flying at night should be aware of their own visual limitations and the possible extended time that dark adaptation will take if they have been exposed to bright sunlight during the day. Exposure to intense glare can have a negative influence on dark adaptation for long periods after the initial exposure.

Since adaptation to light and dark is an individual matter, varying with age, environmental exposure and physical makeup, each pilot should learn to know his own limitations in this respect—and be on guard for changes in his adaptability rate that may be expected. Good vision as well as good judgment still remain the basis of all safe piloting, and the reduced light levels at night call for a maximum visual effort by the pilot.

(Based in part on an article in Aerospace Safety, *December 1970.)*



Light levels under natural conditions range from the minimum brightness to which the eye is sensitive to the highest luminance it can tolerate. Decreases in illumination require eye shifts from cone vision to combined rod and cone and to full rod vision.

Keep It Clean

To the practiced eye (and finger) the dipstick reveals more than the quantity of oil in the sump. Color and feel are important indicators of how well your engine is faring.

Engine lubrication accounts for a very small fraction of aircraft maintenance expense (less than 1 percent), yet neglect in this vital area can measurably shorten the time between overhauls or even shorten the life of an engine. Either result can be very costly, and perhaps unnecessary.

Many pilots assume that one oil is pretty much like another, despite the manufacturers' claims, and as long as they take a quick squint at the dipstick before starting up the engine they feel they are doing their duty in this department.

As a matter of fact, even the reading on the dipstick may be in error—if it happens that the aircraft in question has tricycle landing gear and the nose wheel strut is not normally extended; or if for any reason the reading is not taken on level ground. If more oil is added than actually needed, excess oil will be thrown into the cylinder and burned off during combustion. (Oil expands in volume at altitude or when heated; overfilling leaves no room for this expansion.) The buildup rate of carbon and other oil residue will be sharply increased.

Oils may look alike, but their chemical composition differs and they should not be freely intermixed. The types of oil which may be used with any given engine are mentioned specifically in the engine certification, and no other oils should be used, unless they have been approved by an amended type certificate. FAA will not issue such a certificate before extensive tests, involving hundreds of hours of operating time, have been taken to prove the compatibility of the lubrication fluid with the engine.

Utilization of oil is critical during the first few hours of engine use. The proud new plane owner should practically commit the manufacturer's instructions to memory. For example, some engine manufacturers prescribe the exclusive use of straight mineral oils during the early break-in period of a new engine. Detergent oils should not be added during this period. It is typical of many new engines that during seating of piston rings the oil consumption may be high or erratic—they need close observation for the first 25-50 hours.

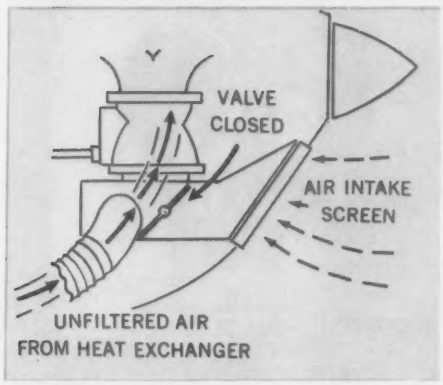
The silent watchdog of the engine lubrication system is the oil filter, usually a tubular screen fitted externally to the engine. In order to protect the engine from possible oil starvation, oil filters either have a bypass valve to allow the oil to circulate around the filter, when it is no longer permeable, or else provide for the screen itself to collapse. Regular replacement of the filter will normally insure continuous filtered circulation. The *suction oil screen*, at the bottom of the sump, is a simple straining device that also helps to keep the oil clean by preventing sludge from entering the system.

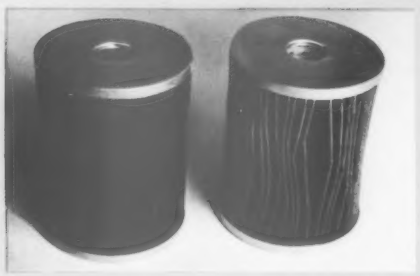
Most types of aircraft oil filters should be replaced at each oil change, and the oil suction screens should be inspected by a mechanic and cleaned at this time. If you want to be really conscientious, you can ask the mechanic to take the oil filter apart to see whether metallic particles are imbedded in it. New engines often show a small quantity of metal flakes on or in the filter at the first several oil changes, but if this condition persists, it calls for disassembling the engine in the shop to determine the cause. Costly as this job may be, it is the only certain means of preventing a possible inflight tragedy.

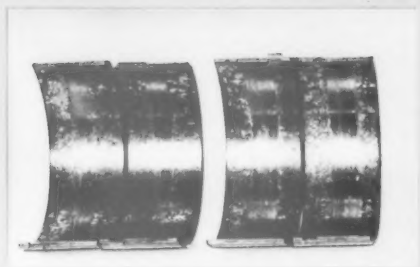
Saving money by not changing the oil filter simply because "it looks all right" is a poor form of economy. Deposits that destroy the porosity of a filter eventually build up sufficient pressure to force unfiltered oil to circulate through the engine. The likelihood of bearing or gear damage from this source would be high.

The composition of oil circulating through the engine undergoes a change from various sources. There is a gradual breakdown of the chemical makeup of the oil as a result of exposure to engine heat,

Carburetor heat check on a dusty, sandy, or gravel su
filtered, allows foreign matter to enter the cylinders an







Above—diagram shows how incoming air for the carburetor bypasses the filter when carburetor heat is on. Right—upper photos show metal in oil control ring (arrow) and worn full-flow oil filters. Lower photos show collapsed oil screen and crankshaft bearings which have been badly scored and pitted due to oil starvation.

pressure, etc. This change is not necessarily accompanied by discoloration, but some of the lubricating value of the oil is lost. That is why the oil change period recommended by the manufacturer should not be exceeded even when the oil appears to be perfectly clean.

Engine oil is also subject to contamination from both liquids and solids. Overpriming an engine commonly results in gasoline getting into the oil sump and contributing to the formation of gum or tar. Overly rich mixture settings, worn piston rings, and infrequent aircraft use may also result in gasoline mixing with oil.

gravel surface should be avoided. Pre-heated air is unnders and be absorbed by the oil system.

Solid particles that may contaminate an oil system, in addition to metallic flakes, are particles of dust, sand, chaff and other foreign gritty matter. Aircraft operating in dusty or sandy areas are particularly susceptible, as are agricultural use aircraft.

Much damage can be avoided if pilots recognize the danger of using carburetor heat at the wrong time. When the carburetor heat is on, the air filter is bypassed in most light aircraft, allowing the engine to be supplied with unfiltered air, which may include all manner of abrasive particles that can cause heavy damage to internal parts. The pilot should protect his engine by closing off carburetor heat as soon as practical during the landing roll. He should also make it a habit never to use carburetor heat while taxiing or ground running. A check of the carburetor heat system should be performed just before takeoff, and only on pavement or sod—not on sand or gravel. In many aircraft the prop wash is designed to create a vortex in the area of the air scoop, and this action will scoop up any loose particles in the area and lodge them in the engine.

In the interests of preventing contamination it is also a good idea to check the oil filler cap occasionally to see that it is secure. Instances are on record where enough oil has been thrown out in flight—either from defective or missing caps—to force the aircraft down.

High or markedly increased oil consumption are matters of concern to the pilot, not merely because of the expense and trouble, but also because they may be symptoms of various internal problems, possibly calling for a top or major overhaul ahead of schedule. Worn rings are probably the most common cause of oil wastage. An examination of the sparkplugs will usually give you a clue. If they are oil fouled, you know that the oil is getting past the rings.

Finally, water is a little suspected but not uncommon contaminant. The lubrication system must "breathe" air in order to function normally, and in doing so, it also takes in moisture. Normally this moisture is evaporated by engine heat, but if you fly from a warm environment into a much colder one, condensation may take place within the oil system. In this connection, it is a good idea to bring the oil level up to full, just as you top the fuel tanks, before bedding your airplane down for the night on a frosty mountain slope.

Compared with the early days of flying, when aircraft pumped oil as a matter of habit, and pilots were used to having it sprayed in their face as well as over the airplane, modern flying is practically devoid of oil "problems." That does not mean that engine lubrication is any less vital to the operation of an aircraft. Like the circulation system of any living creature, you scarcely know it exists until something goes wrong. But engines can be ruined in a few minutes by careless or ignorant operation under conditions that obstruct oil flow or admit harmful abrasives into the system. Intelligent care can prevent this. L.D.G.

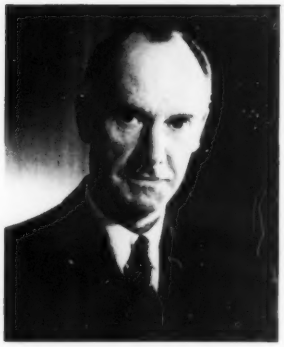
Editor's note: An earlier article, "In The Green" (October 1970) discussed inflight engine failures associated with the lubrication system of light aircraft.

Famous

FLIGHTS

Queen for a Day

The story of Sir Geoffrey de Havilland, whose revolutionary jet transport momentarily made England the international leader in civil aviation.



Sir Geoffrey de Havilland

On a surprisingly clear afternoon in May 1952, large crowds were gathered at London Airport to witness the beginning of a revolutionary new means of air travel. The 500 mph *Comet* was about to start its career as the first jet air transport in passenger service.

In its first half century of existence, the Age of Flight had seen global distances gradually shrink in terms of travel time, as airspeeds moved up to 100, 150, 200 and even 250 mph. But the idea of suddenly doubling this speed was fantastic—it meant that a man could breakfast in London, lunch in Rome and return home comfortably before nightfall. Or—he could cross the Atlantic twice in a single day. Time seemed on the verge of being annihilated.

In 1941, an Englishman, Sir Frank Whittle, had first produced a successful jet engine, which became the basis for American as well as British jet engine development. But jet travel had been restricted to military aircraft, as WW II absorbed the economic energy of the combatants.

By 1943 the Allies became confident they would win the war, and some statesmen began looking ahead. The British preparations for peace included a request to their premier aircraft designer, Sir Geoffrey de Havilland, to develop plans to put a trans-Atlantic mail/passenger jet transport into service after the war. Britain's prospects were dimmed by an agreement among the Allies that America would provide all Allied transport planes and Britain would supply fighters and bombers. There were exceptions, of course, but on the whole, America was far ahead in the development of piston-engined transport airplanes and evidently would capture the lion's share of the postwar transport market.

De Havilland responded with enthusiasm. His company made an early entry into the aircraft gas turbine field in 1941 with military jets powered by the *Goblin* and later the *Ghost* engines, and he was willing to gamble his future on a jet plane that might give Britain a world-wide lead in commercial air transportation.

He felt the increased speed of a jet airliner would do away with tiresome day-long journeys in a narrow confined space. The simplicity of the engine would make for easy maintenance and the absence of vibration. Jets could fly best at very high altitudes (40,000 feet); this meant a smoother ride above the clouds. The prospects were enticing, but the problems were staggering.

Jets had a fuel consumption four times that of piston engine planes. Cruising at 40,000 feet would require artificial atmosphere in the cabin for comfort and survival —at that time pressurized cabins were unheard of in a passenger plane (used only in photo reconnaissance). A heated cabin would be needed for the sub-zero temperatures of high altitude flight. Since the jet would fly faster and higher than any plane of the day, more knowledge of the stress it would be exposed to was necessary.

Fatal boomerang

De Havilland Company went to work on two designs, one conventional, the DH 106, the other more radical, the DH 108. The 108 *Swallow* was shaped like a boomerang, with sharply swept back wings and no tail.

On May 8, 1946, soon after the first few tentative trials of the *Swallow*, de Havilland's eldest son and chief test pilot for the company, Geoffrey Jr., was killed when the DH 108 he was flying went out of control and crashed as he was practicing for an attempt on the world's speed record of 616 mph. The *Swallow* was abandoned in favor of the more conventional DH 106.

De Havilland's chief designer, Ronald Bishop, had designed it around four de Havilland *Ghost* jet engines which had been developed from F. B. Halford's *Goblin* engine. The DH 106 *Comet* had a 40° angle wing sweepback and 82,000 lbs. all-up weight. The wing sweep was later revised to a 20° angle for better lift, and the weight increased. These revisions would reduce the cruising speed by 25-35 mph, but the *Comet* would cruise along at 505 mph—still an amazing increase over the 250-300 mph of existing piston-driven planes.

On January 21, 1947, de Havilland was asked to proceed with 14 aircraft. The planes were ordered right off the drawing board to save the two or three years a prototype would require. The *Comets* were priced at £450,000 (about $2,250,000) each, which seemed high at the time, but de Havilland did not begin to break even until the 15th *Comet* was produced.

To make up for the weight of all the extra fuel the jet would carry, the aluminum alloy skin was as thin as a postcard and glued to the frame with special glue to eliminate heavy rivets. Work proceeded at a record pace, and within four years on May 2, 1952, the first inaugural flight was scheduled: London to Rome in two hours!

Success was immediate. The *Comet* was a delight to fly in. Reservations were booked months in advance. Everyone, even the Royal family, wanted to try this fast, comfortable, noiseless (for the passenger) airplane. BOAC ordered 24 of the new jets and soon provided convenient service to South Africa, Rome and the Far East.

England, with de Havilland at the helm, seemed well on her way to rule the commerce of the air as she had once ruled the seas.

Then disaster struck. It started with a series of small accidents but soon the *Comet's* shiny record was darkened by a succession of tragic and mysterious crashes and mid-air explosions. De Havilland made frantic efforts to identify the problems and correct them, but they continued.

On January 10, 1954, a *Comet* took off from Rome with 35 persons aboard and was seen to explode in flight over the Mediterranean.

Two months later a *Comet* took off from the same airport in Rome, reached an altitude of 28,000 feet and exploded. Shock reverberated throughout the world and fears were expressed that man was not intended to move with such "unnatural" speed. An exhaustive investigation was

ordered by the British Government, while the world looked on.

The mysterious cause of the *Comet* crashes seemed hopelessly elusive. But de Havilland was not easily discouraged. In his long aviation career he had come up against repeated business hardships and personal tragedies, yet somehow he always managed to continue his work. Born in 1882, he had spent his youth admiring the successes of Bleriot, the Wrights and Santos-Dumont. His first attempt at flight, in 1909, in a pusher-propeller biplane he and a partner had built ended in a destructive crash and the apparent loss of his capital.

But de Havilland patiently put the pieces back together, taught himself how to fly, and later sold the plane to the British Army. De Havilland was happily hired to supervise the development of the British military airplane.

Once WW I was in full swing de Havilland was pressed to come up with a high performance airplane to match the dreaded German Fokker. He responded with the 100 mph DH 2. By 1917 over 300 planes a month were coming out of the Aircraft Factory and holding their own on the battle "fields."

With an eye to the future, de Havilland formed an aircraft company after the war and began to design a light and inexpensive plane for the amateur weekend flyer. He came up with an all-wood biplane with wings that folded back along the fuselage (for storage). The *Cirrus* 4-cylinder engine turned out 65 hp. The plane featured dual controls and a locker behind the pilot's seat. It was small enough to be stored in a garage or attached to a car and towed. Named after de Havilland's favorite insect (he was a collector of moths), The *Cirrus Moth* was the start of a whole series of famous light planes.

The *Moths* were sold at an equivalent of about $2,500. Soon spare time flying was practically a national pastime in England. By 1926 there were half a dozen *Moth* varieties on the market, and seemingly no end to the species. De Havilland even began to manufacture his own engines for them.

With the outbreak of WW II in Europe and the conscription of all private planes, weekend flying stopped short. De Havilland's factory put aside all current plans and hastened to develop war planes, while enemy bombs fell nearby.

As usual, de Havilland produced a winner. Used as a bomber, photo reconnaissance plane, night and daytime fighter and high altitude fighter, the DH 98 *Mosquito* was the most versatile warplane ever made. To spare the already over-burdened metal industries, the *Mosquito* was designed to be constructed exclusively of wood. From 1940 until the end of the war over 7,000 *Mosquitos* were built. De Havilland produced 18,000 additional military planes for England.

After the war de Havilland was left to recover from deep personal wounds. In three years he had lost two of his three sons in plane crashes and his wife, who had died of illness.

Nevertheless, de Havilland continued to work with enthusiasm. He accepted setbacks as a challenge even when they affected his life drastically. It was this nonconceding spirit that drove him to leave no stoned unturned until the cause of the *Comet* disasters of 1954 was found and the aircraft returned to the sky. He organized all his resources to get to the source of the failure. His search was to involve the most extensive tests ever devised for an aircraft. Finally, in June 1954, in a specially-built water tank for testing the ultimate strength of the fuselage, after what represented 9,000 hours of flying time, a rent appeared at the corner of a windowframe. The key to the mystery was simple *metal fatigue*.

Key to the mystery

Not much was known about metal fatigue in 1952. National and international law required aircraft materials to be designed for twice the normal working pressure—with no allowance for a weakening of metals through the stress of flight. De Havilland had used a design pressure of two and one-half times the working pressure. The repetitive cycle of pressurization and depressurization incurred with many successive flights in the working life of the aircraft brought about metal fatigue in the cabin structure and ultimately ruptured the hull. De Havilland set about the tremendous task of incorporating the new knowledge acquired in the production of a modified jet, the *Comet 4*, to be marketed with the same name as its ill-fated predecessor. Impressed with de Havilland's confidence, BOAC ordered the first production models.

Comet 4 was subjected to the most severe stress tests in the history of commercial aviation. After being tested to an equivalent of 80 years operation, the prototype received certificates of airworthiness from the United States and Britain.

Heated cabin of the Puss **Moth** ended drafty discomforts of open cockpit flying.

The new *Comet* was the first jet airliner to enter regular trans-Atlantic service. (October 4, 1958) and was hailed as a great improvement over the old *Comet*. Larger and faster, with four new Rolls-Royce Avon engines, each with 10,500 lbs. of takeoff thrust, and a marked reduction in fuel consumption, the plane was capable of a speed of Mach .78 (about 515 mph) and could fly from London to New York in 6 hours.

The success of *Comet* 4 was soon eclipsed by the swift appearance of the larger and more economical American jet transports—Boeing 707, the DC-8, and the Convair 880—as American plane manufacturers quickly regained their dominance in commercial transportation. The agonizing years of study and research which made *Comet 4* a safe airplane helped pave the way for a new era in flight safety, even though the *Comet* itself faded out of sight.

De Havilland is known today in the United States chiefly for products of the Canadian subsidiary, which provides aircraft for many air taxi and commuter lines.

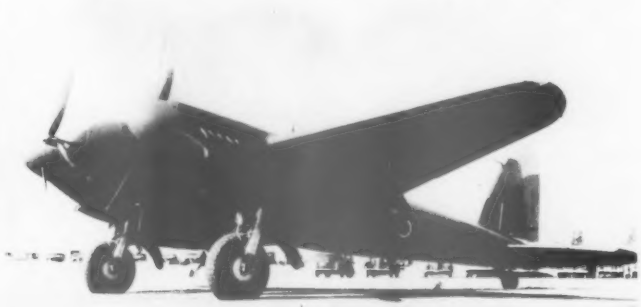
Knighted in 1944 and honored repeatedly for his work, Sir Geoffrey de Havilland never gave up trying to conquer time, but time itself caught up with him, forcing him to slow down in his later years. Although he had clear ideas for guided missiles and rockets, de Havilland discovered at age 80 that he really did not have the energy to develop his plans. He died two years later.

De Havilland may not have equalled Puck's boast to circle the earth in forty minutes but his beloved *Comet* lighted up the skies like a shining herald of marvels to come.

M.W.

Fold-back **Moth** wings were popular with city and town dwellers.

The DH98 **Mosquito,** called the most versatile warplane ever built.



INSPECTION AIDS 8

A series of articles on maintenance problems of general aviation aircraft.

DOWN the DRAIN

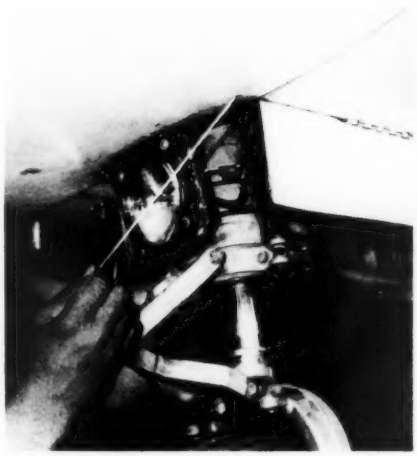
Wire in the shape of a thin straw makes a good probe. An oil stain is a suspicious symptom.

Almost everything that goes into an airplane must come out, sooner or later, and this includes moisture. That is why aircraft manufacturers locate small drainholes strategically at low points on the fuselage, wing, and tail. You may never have noticed them, or if you have, you may have thought they indicated a missing rivet or a puncture in the fabric. Hopefully you did not try to plug them up with a metal screw or a strip of tape, because you could have set the stage for serious corrosion problems.

Moisture normally is present in aircraft in the air. Under conditions of lowered air temperature, the moisture may condense and collect in pools at the low point of the particular structure involved. If the drainhole located at this point is blocked for any reason, a considerable pool of water may develop. In subsequent flight, this water may be sloshed over control cables, hinges or various steel fittings which in time will rust. Or, at an altitude where the ambient temperature is below freezing, ice may form and interfere with the movement of control linkage.

The possibility of inadvertently clogging drainholes is great when an aircraft is operated in slush or mud; in freezing rain or snow; or after it has been waxed or repainted. The consequences of blocking the escape of moisture may be weeks or months in showing itself, but when it does appear, in the form of a structural or control failure (weakened by corrosion), there may be no warning.

Drainholes also serve the important function of allowing oil, hydraulic fluid, fuel or other liquids, which may be leaking from ruptured lines or damaged tanks, to escape. Otherwise the fluid could accumulate within the aircraft and possibly provide a fire hazard, while the leakage remained undetected.



Poking in drain holes is best done in other than your best clothes. You need a patient hand, a sharp eye, and an agile back. All separate structures, such as flaps (above) have a drainage opening. Many pilots and plane owners are totally unaware of the existence of drainholes.

Any pilot who does not mind stooping down can perform an adequate inspection of drainholes, armed simply with a thin piece of stiff wire. The wire is a useful adjunct to the naked eye, since a clear coating of wax or oil may make the hole *appear* open when it is not. The presence of oil or rust or any foreign matter around a drainhole is usually a sign of trouble within, and calls for the attention of a mechanic.

With patience and a little practice, it is easy to learn where to look for drainholes. Each separate structure on the aircraft will have at least one—including ailerons, flaps, struts, rudder, etc. You can save a lot of time on your first walk-around if you ask a mechanic to help spot the drains for you.

One word of caution. Do not use too large a wire for the hole, and do not poke blindly around inside the aircraft. There is a lot of delicate machinery in there. In fact, you can play it safe by using pliers to make a bend in your wire probe so that it will not penetrate more than a quarter of an inch.

Airplanes have thin skins, but they need airholes to breathe. ■

(Related incidents have been reported in "General Aviation Inspection Aids Summary, 1970." Complete sets of these reports (AC 20-G) are available from the Superintendent of Documents, Washington, D.C. 20402. Domestic subscription is $3.00, foreign $3.75.)

(continued from page 5)

Detailed manufacturing standards for five types of transmitters are found in RTCA Document Nos. DO-138, DO-145, DO-146, DO-147, which will be incorporated into FAR Part 37.200 under the title "Emergency Locator Transmitters—TSO-C91." The three types classified as "Automatic" will meet rigid standards. They are "Automatic, fixed" (ELT-AF) which would be permanently attached to the airplane; "Automatic, portable" (ELT-AP) which would be mounted in a bracket for easy removal and installation, and "Automatic, deployable" (ELT-AD), designed to separate from the plane either automatically or manually. (It is unlikely that such a unit would be consumed by a post-crash fire or rendered inoperative by submersion.)

The fourth or "Personnel" type (ELT-P) was originally designed as a manually-operated ELT to carry in pocket or glove box but new standards call for it to activate automatically as well. To conform with the terms of the Federal law, it will have to be "attached" to the airframe, but the attachment may be a convenient bracket from which it can be easily removed. Although the Automatic-Portable and Personnel-Automatic will be similar in many respects, (in that they will both activate automatically as well as manually and will both be mounted in a bracket for easy removal), the standards for the "Personnel" type will be less rigid than the other types (as to what temperatures they will withstand, degree of water-resistancy, etc.). These less rigid standards will presumably result in a smaller price tag—an advantage that will undoubtedly be of interest to many general aviation plane owners.

The fifth classification is the "Survival" type (ELT-S), which would be portable, self-bouyant, water-resistant, independently powered, generally attached to a life raft, and designed for use in overwater flights.

FAA is seeking comments and suggestions on the proposal before writing the rule in final form. Opinion is specifically solicited on whether the proposed 75 milliwatt power output is the best choice, and if not, what figure would be preferable. Other important considerations include: "false alarms" or accidental transmissions, and methods for minimizing them; conditions under which tests, demonstrations and practice missions could be conducted; and establishment of a comprehensive network of monitoring stations to receive the ELT distress signal.

Comments on the proposed rule and its incorporated TSOs should be submitted in duplicate to DOT/FAA Office of the General Counsel, Attention: Rules Docket, GC-24, 800 Independence Ave., S.W., Washington, D.C. 20590. Docket No. 10915, Notice No. 71-7 should be noted. The complete Notice appeared in the Federal Register on March 13, 1971. R.T.

Pilot BRIEFS

have been raised by FAA. Planes having ten or more passenger seats, or weighing over 12,500 pounds, will now be required to meet the airworthiness standards for transport category airplanes (FAR Part 25). The new regulation went into effect March 13, 1971, and applies to all planes for which an application for type certification is made after that date. In the past, only planes weighing more than 12,500 pounds have been required to meet the standards for transport category.

Standard Instrument Departures (SIDs) and Standard Terminal Arrival Routes (STARs) will now be used routinely in the issuance of IFR clearances by Air Traffic Control. (SIDs and STARs are preplanned procedures with reference to local fixes.) Pilots, as always, have the privilege of accepting or rejecting any portion of any issued clearance. Pilots not wishing to use SIDs or STARs in an IFR clearance can mark their flight plan "No SID/STAR" in the "Remarks" section.

Pilots, aircraft owners and mechanics are reminded to report any malfunction or defect of an aircraft to FAA. Voluntary reports enable FAA to identify safety problems quickly and bring them to the attention of the manufacturer. Pertinent material is included in General Aviation Inspection Aids, or in Airworthiness Directives (ADs). Any mechanical difficulties should be reported to FAA on Form 8330-2 (OMB:04-R0003) commonly called an M or D report. Self-mailing forms are available at many airports, repair stations and FAA offices.

Private Pilot's Handbook of Aeronautical Knowledge (AC 61-23), FAA's standard flying primer, is out of stock at the Superintendent of Documents, Washington, D.C. A new supply is not expected for three or four months.

is now mandatory for all civil aircraft flying between Mexico and the United States, in accordance with the provisions of FAR amendment 91.12 which is viewed as a safety measure to combat dangerous flight techniques being used by airborne drug smugglers in an attempt to avoid detection. These include low flying, the use of unsafe landing areas, and violent evasive maneuvers. For complete information consult the latest International Flight Information Manual and the Airman's Information Manual, Part 1, Chapter 4, National Security Section.

Flight Instructor Refresher Courses

Calendar Year 1971
June through August

6/1-3	Mass. Aeronautics Commission Boston, Mass.	FII	7/20-22	N. Y. Dept. of Aeronautics Albany, N.Y.	FIA
6/1-3	Kansas Wing CAP Wichita, Kansas	FIA	7/27-29	CAP Atlantic City, N. J.	FIA
6/8-10	Univ. of Ill. and AOPA University of Illinois	FIA	8/3-5	State Dept. of Aeronautics Warwick, R.I.	FII
6/15-17	San Juan Port Authority San Juan, Puerto Rico	FII	8/3-5	Cape Girardeau Aircraft Owners & Pilots Club Cape Girardeau, Mo.	FIA
6/15-17	Penn State University State College, Pa.	FIA	8/10-12	AOPA/Allegheny Co. Pittsburgh, Pa.	FIA
6/22-24	AOPA and Ohio State Univ. Ohio State University	FII	8/17-19	San Mateo Jr. College San Mateo, California	FIA
6/29-7/1	CAP Kansas City, Kansas	FII	8/17-19	Kent State Univ. Kent, Ohio	FIA
6/29-7/1	Auburn Univ. Auburn, Ala.	FII	8/24-26	Southern Louisiana Flight Instructors Association Baton Rouge, La.	FIA
7/6-8	Vincennes College Vincennes College, Ind.	FIA	8/24-26	Memphis State Univ. Memphis State, Tenn.	FIA
7/13-15	AOPA/Florida Dept. of Transp. Tallahassee, Fla.	FII	8/31-9/2	AOPA/Orange Coast College Costa Mesa, Calif.	FIA
7/13-15	Indiana State University Terre Haute, Ind.	FII	8/31-9/2	Wisconsin Dept. of Aero.	FIA

SYMBOLS:
FIA=Flight Instructor, Airplane FII=Flight Instructor, Instrument
AOPA=Aircraft Owners & Pilots Association CAP=Civil Air Patrol

(To enroll, contact the sponsor)

Recommendations for STOL Port Planning Published

Recommended criteria for the planning and design of STOL airports in metropolitan areas are presented in a new FAA publication, "Planning and Design Criteria for Metropolitan STOL Ports", AC 150/5300-8. The advisory circular outlines the basic physical, technical, and public interest factors which should be considered in planning and establishing metropolitan STOL ports.

The criteria provided are advisory in nature and do not establish requirements except when Federal funds are used for the development of a STOL port. FAA is creating a new V/STOL office to stimulate development of this segment of aviation.

The use of STOL for city-center to city-center and intra-city air passenger traffic would serve two prime purposes—cut down on travel time for the passenger and relieve airspace and ground congestion at larger airports. Illustrations of proposed STOL ports are provided in the advisory circular.

Copies may be obtained free from the DOT Distribution Unit, TAD-484.3, Washington, D.C. 20590.

LOOK ALOFT. Many communities are getting road assistance as well as law enforcement out of the blue from specially trained policemen on helicopter duty.

Nation's Top Mechanics Named

Clyde Larry Mings of Executive Airlines, Sarasota, Florida, is the 1970 national winner of the FAA Aviation Mechanic Safety Award in general aviation. He was honored for outstanding work in avionics maintenance.

In the air carrier category, Norman L. Kendig, of Eastern Airlines in Seattle, Wash. received the top award for the isolation and correction of a control surface problem.

Each winner will receive more than $1,000 in prizes. Complete details will appear in the June issue.

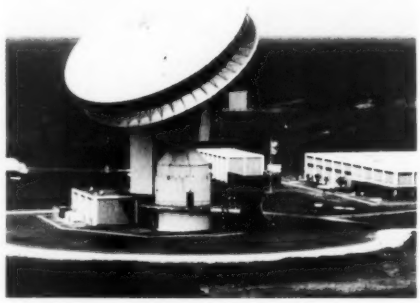
Technical Standards Proposed for All Aircraft Transponders

Aircraft transponders would be required to meet prescribed technical standards under a proposed FAA rule change, designed to insure the unit's reliability and its compatibility with other air and ground equipment. Separate technical standards designed specifically for general aviation aircraft are spelled out in the rule, and are primarily concerned with satisfying conditions of temperature, altitude, humidity, shock, vibration and power input voltage.

In general aviation aircraft, transponders (which aid air traffic controllers in identifying aircraft on radar scopes) are now required only in positive controlled airspace (at high altitudes) and in Terminal Control Areas at a few specified airports.

Transponders installed on general aviation aircraft after January 1, 1972, would have to meet either the air carrier or general aviation criteria. Transponders already installed on aircraft could be used until January 1, 1975.

The new FAA proposal is intended to improve the quality of transponder returns and to speed up the radar identification of aircraft by air traffic control. Comments on Notice No. 71.10, Docket #10955, should be submitted in duplicate by June 30, 1971, to FAA Rules Docket, GC-24, 800 Independence Ave. S.W., Washington, D.C. 20590. Mention notice and docket number.



DISHING IT OUT. This 97-foot diameter parabolic dish antenna at Paumalu, Hawaii, is part of the satellite system used by FAA to relay messages across the Pacific.

Guidelines for Airport Hearings

FAA has issued an advisory circular that gives guidelines for conducting public hearings which are required to qualify an airport project for consideration for Federal aid. AC 150/5100-7, Requirement for Public Hearings in the Airport Development Aid Program, dated January 4, 1971, may be obtained from Department of Transportation Distribution Unit, TAD-484.3, Washington, D.C. 20590.

Flight FORUM

FAA Aviation News welcomes comments from the aviation community. We will reserve this page for an exchange of views. No anonymous letters will be used, but names will be withheld on request.

• Blocked Airspace

Your article in the September issue, "Twelve O'Clock Low," (on military airspace) brings to mind a recent incident.

Enroute to Dallas we were advised by ARTCC, "Due to a military block at your altitude, we're giving you an altitude and routing change."

Because of our limited amount of fuel and the adverse wind conditions we advised the Center that we could not accept the change. After much deliberation we were given our original altitude and routing.

Since the military block at that altitude was not published or NOTAMed, who has the right of way? Can the military, at a time of no national emergency, indiscriminately block any piece of airspace without prior notice?

Richard Schmitt
Danbury, Conn.

In the case of certain military air operations that are vital to national defense, an accommodation is made through the altitude reservation concept which preplans, coordinates and approves special use of the air space. Routine military operations are handled under normal air traffic control procedures.

An altitude reservation does not preclude normal air traffic control from using this airspace for other traffic provided that standard IFR separation is maintained between the military (or special operation) and other traffic. Notices to Airmen are not normally issued on altitude reservation traffic unless it is determined that it may adversely affect other traffic for an extensive period of time.

• First Come—Wait for Second

A situation has developed at one of the local uncontrolled airports that has only a single runway with small turn-around pads at either end. Aircraft landing to the west have to taxi along the runway back to the east end in order to turn onto the taxiway leading to the hangars. This sometimes creates a potential conflict with successive aircraft landing to the west.

Part 91 of the FAR's states that the aircraft on final has the right of way over all other aircraft in the air or operating on the ground. The FAA Handbook 7110-8A for controllers states that no aircraft will land until the preceding aircraft has cleared the runway.

Some of the local pilots, going on the basis of the FAR's, feel that the first aircraft to land should wait at the end of the runway until the second aircraft has landed. Others, especially those flying larger planes, feel the first to land has the right of way until clear of the runway. Has there been an FAA ruling on this in the past?

Bernard E. Myers
New Bloomfield, Pa.

FAA Handbook 7710.8A prescribes air traffic control procedures for use by personnel providing air traffic control services, while FAR Part 91 prescribes rules governing the operation of aircraft.

There is no FAR to cover the situation mentioned in your letter. Good judgment is required and pilots must be particularly alert when operating on or in the vicinity of an uncontrolled airport.

We agree that the first aircraft to land should taxi to the end of the runway and wait until the second aircraft has landed, provided there is a suitable turn-around pad. In any case, the second aircraft should not land until the first aircraft is clear of the runway. These are not regulations, merely good operating practices.

• No Knock Ice Prevention

Your article "Winter Cough" in the November 1970 issue of FAA AVIATION NEWS has a controversial paragraph (on enriching fuel mixture before applying carburetor heat, to prevent detonation on some kinds of carburetors) which we as an engine manufacturer find worrisome.

Our test flight results during induction icing conditions have indicated that to go from a lean mixture to full rich greatly increases the refrigeration action in our Lycoming powerplants. We also found that at cruise power there is only a remote possibility of detonation in our flat opposed engines resulting from carburetor heat.

We have found that in our engines utilizing either fuel injection or carburetion, and with a carburetor air temperature gauge, if we keep a minimum of 90°F. hot air in the induction system, we are able to prevent the formation of ice. The principal concern of the pilot under these circumstances is not the remote possibility of detonation from the heat at cruise power, but rather to keep the engine running no matter how much heat is required.

J. A. Diblin
AVCO Lycoming Division

• Keeping Posted on Changes

In the article "Follow That Snark" (December/January issue of AVIATION NEWS) reference is made to the ceiling of the Airport Traffic Area being 3,000 feet. I had previously believed the Airport Traffic Area to extend up to but not including 2,000 feet above the ground. After much probing I learned from the GADO office that such a change in regulations had been made but not publicized.

I presume that the current Airman's Information Manual has this information but I no longer subscribe to it.

I am writing this to inquire what channels may exist to notify pilots of such matters in the name of safety.

William A. Bourke
Plainview, L.I. New York

If you do not subscribe to the Airman's Information Manual, you should check it regularly at Flight Service Stations for recent NOTAMS that are important for your flight safety.

The "Pilot Briefs" column of FAA AVIATION NEWS will normally alert you to important rule changes of this kind. Discussion of the ceiling change at Airport Traffic Areas was omitted from the December/January issue because the new ceiling was given in the "Snark" article. We regret not having clarified this matter more effectively.

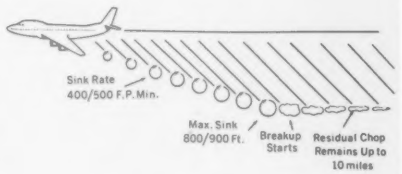
• Vortices and the TCA

I have read "TCA and the VFR Pilot" in the August FAA AVIATION NEWS and have doubts about the safety of flying VFR through the center of a terminal control area in a "corridor".

Since the large jet aircraft operating around the corridor create severe turbulence known as wingtip vortices, it seems inevitable that the vortices left as these aircraft descend or climb will be moved by the winds into the VFR corridor.

What tests have been conducted by the FAA to determine the severity and persistence of these vortices created by the jets? I would like to see comparisons of the vortices created by various aircraft such as the DC-8, Boeing 727 and 747, etc., so that I would know how long these turbulent areas would remain in a given area on a calm day.

Myron D. Hutson
Merritt Island, Fla.



The VFR corridors were provided in some TCA's to give VFR aircraft a transition route through the TCA airspace. These corridors were geographically placed to limit the exposure of VFR planes to the large aircraft operating to or from the airport, and to reduce the possibilities of wake turbulence encounters.

Data from a comprehensive test program in February 1970 by FAA to determine the severity of wake turbulence generated by large aircraft are still being analyzed, but preliminary comparisons of the airplanes you mentioned indicate that the maximum velocities *of the vortices of all the planes were similar (about 90K) but the field of influence is larger behind a larger plane. The tests also showed that wake turbulence begins to dissipate after 90 seconds, and does not drift more than 800-900 feet below the generating aircraft. We will report on the test findings as soon as they become available.*

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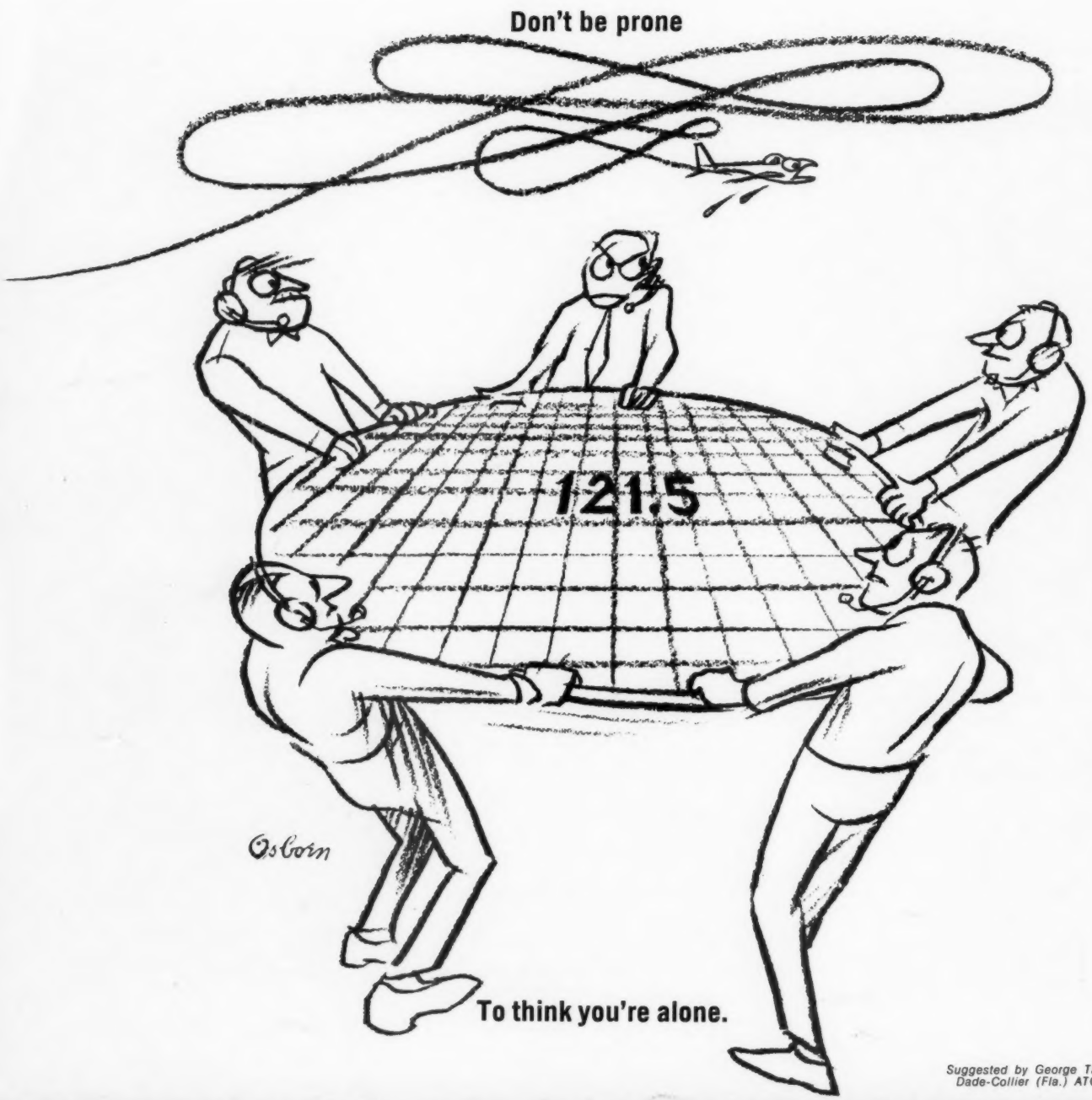
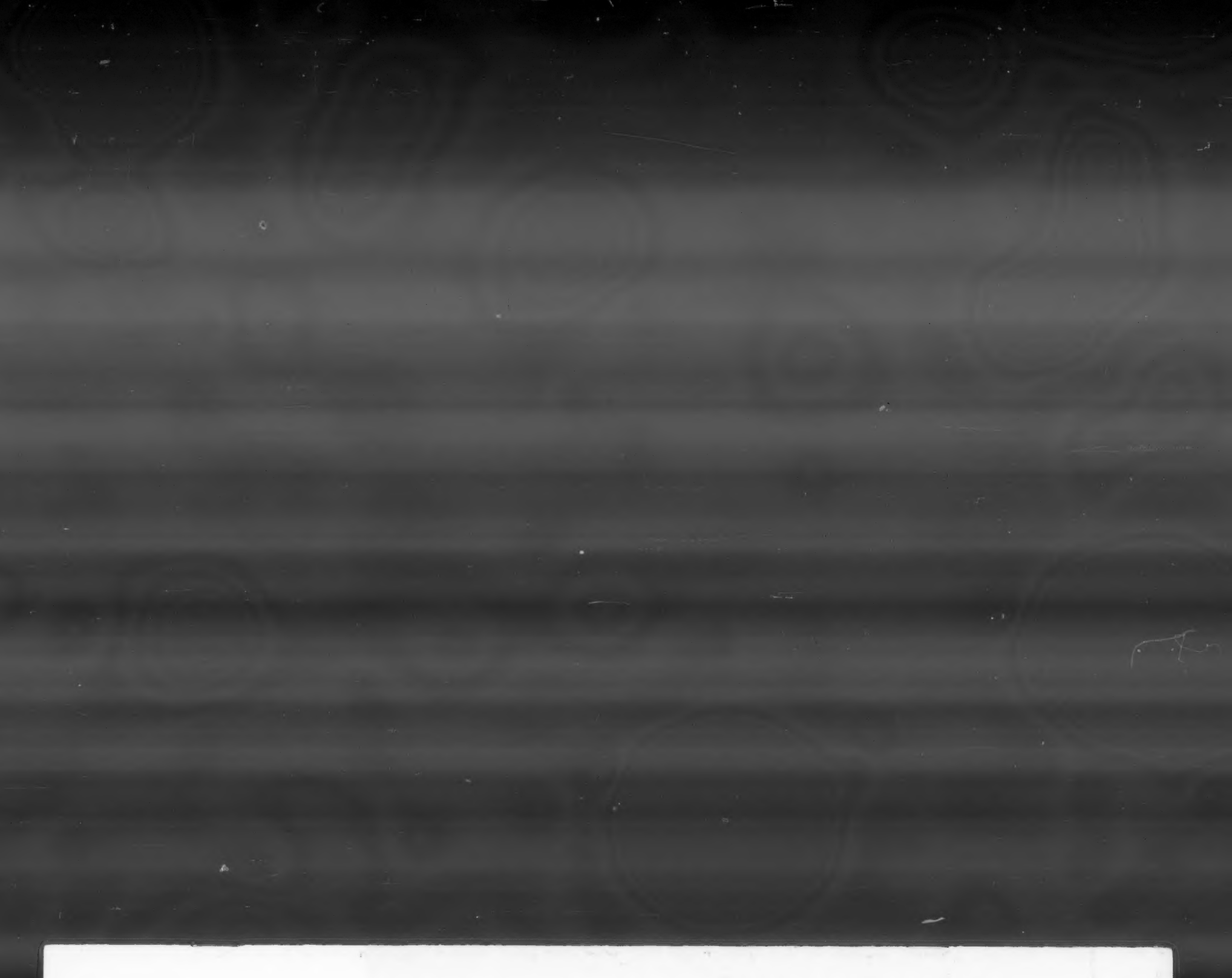
Suggested by George Tanner, Jr.
Dade-Collier (Fla.) ATC Tower